



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2002IA10B

Title: Fate and transfer of antibiotic-resistance genes excreted by farm animals

Project Type: Research

Focus Categories: Agriculture, Groundwater, Non Point Pollution

Keywords: gene pollution, bacteria, contaminant transport, natural attenuation, public health

Start Date: 03/01/2002

End Date: 02/28/2003

Federal Funds Requested: \$21,996

Non-Federal Matching Funds Requested: \$44,000

Congressional District: Iowa 1st

Principal Investigator:

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Abstract

This project will enhance risk assessment and control strategies for the increasing possibility of environmental contamination by antibiotic-resistant bacteria, which could transfer their resistance genes to human pathogens in the environment or via harmless indigenous microorganisms ingested by humans. Gene transfer could occur by direct mechanisms such as conjugation (i.e., cell to cell mating with plasmid or chromosomal gene transfer), or by indirect processes such as transformation (i.e., cell uptake of free DNA from the environment), and transduction (i.e., transfer via virus) (Madigan et al., 2000). Note that gene vectors may soon become an important category of pollutants that may experience a different fate than the bacteria that initially harbor them, due to horizontal and vertical gene transfer. Thus, determining the fate, transport, transfer, and decay kinetics of gene vectors in the environment will help formulate more accurate mathematical models to support regulatory and management decisions (e.g., to set total maximum daily loads [TMDLs]). This project will also train graduate students and hence, it will not only benefit environmental and public health, but it will also strengthen our scientific, engineering, research, education, and human resource base. At the conclusion of this study, the environmental factors and mechanisms affecting the persistence of antibiotic resistance genes will be better understood and our capability to assess and manage the associated risks will be improved.